UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
GE-HITACHI GLOBAL LASER ENRICHMENT LLC	)	Docket No. 70-7016-ML
	)	
	)	ASLBP No. 10-901-03-ML-BD01
(GLE Commercial Facility)	)	
	)	

NRC STAFF TESTIMONY RELATED TO
TOPIC 6: ENVIRONMENTAL MONITORING PROGRAM

Q1: Please state your name, occupation, employer, and professional qualifications.

A1: (KF) My name is Karl Fischer. I was an Environmental Systems Engineer in the Environmental Science Division of Argonne National Laboratory (ANL) full-time until May 31, 2012. As of June 4, 2012, I am employed full-time by the University of Michigan as a Senior Health Physicist and in the process of being rehired as a part-time employee by ANL. I am providing testimony under a technical assistance contract with the U.S. Nuclear Regulatory Commission (NRC) staff. A statement of my qualifications is attached.

A1: (MAB) My name is Matthew Bartlett, and I am a Project Manager and Health Physics Reviewer in the NRC's Office of Nuclear Material Safety and Safeguards, Division of Fuel Cycle Safety and Safeguards. A statement of my qualifications is attached.

A1: (SE) My name is Stan Echols. I am a Project Manager and a Senior Environmental Engineer in the NRC's Office of Nuclear Material Safety and Safeguards, Division of Fuel Cycle Safety and Safeguards. A statement of my professional qualifications is attached.

A1: (TJ) My name is Timothy C. Johnson. I am a Senior Project Manager in the NRC's Office of Nuclear Material Safety and Safeguards, Division of Fuel Cycle Safety and Safeguards. A statement of my professional qualifications is attached.

A1: (JD) My name is José Díaz, and I am a Senior Fuel Facility Project Inspector in the NRC's Region II Office in Atlanta, Georgia. A statement of my qualifications is attached.

Q2: Please describe your responsibilities with regard to the NRC staff's review for the proposed GE-Hitachi Global Laser Enrichment LLC (GLE) Facility in Wilmington, North Carolina.

A2: (KF) I served as ANL's Deputy Team Lead and Document Manager on its contract with the NRC staff to provide technical assistance for the preparation of NUREG-1938, "Environmental Impact Statement for the Proposed GE-Hitachi Global Laser Enrichment, LLC Facility in Wilmington, North Carolina," February 2012 (FEIS) (Ex. NRC003). In this role, I was responsible for overseeing the ANL subject matter experts who contributed to the FEIS.

A2: (TJ) As the Licensing Project Manager (PM) for the proposed GLE project, I oversaw the licensing review of the application for construction and operation of the proposed uranium enrichment facility submitted by GLE and the preparation of the Safety Evaluation Report (SER), "Safety Evaluation Report for the General Electric-Hitachi Global Laser Enrichment LLC Laser-Based Uranium Enrichment Plant in Wilmington, North Carolina," NUREG-2120 (Ex. NRC001). I have been the PM for the project since its inception in October 2006, when General Electric-Hitachi submitted a letter indicating its intent to submit a license application for the project.

A2: (MAB) I am a Health Physics Reviewer in the NRC's Office of Nuclear Materials Safety and Safeguards. Although I did not participate in the development of the GLE SER (Ex. NRC001), I have been selected to replace the Health Physics Reviewer who helped prepare the SER, who recently left the agency. I have reviewed Chapter 4, "Radiation Protection," of the SER (Ex. NRC001), and the sections of the License Application (LA) (Ex. GLE004) that are

addressed in this chapter of the SER. Based on this review, I agree with the findings and conclusions in the SER on this subject.

A2: (SE) I was the primary reviewer of the Applicant's environmental protection measures. My review and evaluation are provided in Chapter 9, "Environmental Protection," of the SER (Ex. NRC001).

A2: (JD) I was not involved in the review of the application for the proposed GLE Facility. However, I am a Senior Fuel Facility Inspector within the division (in the NRC's Region II Office) that is responsible for performing the Operational Readiness Review (ORR) inspection that, if the Applicant is granted a license, would need to be completed before the Applicant could begin operations, and for performing regular facility inspections that would occur during operation of the proposed GLE Facility.

Q3: What is the purpose of your testimony?

A3: (KF, TJ, MAB, SE, JD) The purpose of our testimony is to provide information about the key elements of the Environmental Monitoring Program for the proposed GLE Facility, including how hazardous and radiological effluent releases into the atmosphere, surface water, and ground water will be tracked; the NRC staff's rationale for concluding that the proposed measures are adequate; and how the Applicant and the NRC staff will use the results of the monitoring program to correct problems and ensure ongoing compliance with environmental requirements.

Q4: Please identify the key NRC guidance documents applicable to the environmental monitoring program for a uranium enrichment facility.

A4: (KF) There are two key NRC guidance documents applicable to the environmental monitoring program for a uranium enrichment facility:

- NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs" (Ex. NRC006), discusses environmental information that should be considered by applicants in preparing the Environmental Report (ER) to be submitted

with their applications, and provides guidance to the NRC staff for its review of the ER and development of the environmental impact statement (EIS).

- NUREG-1520, "Standard Review Plan for the Review of a License Application for a Fuel Cycle Facility" (Ex. NRC005). The NRC staff used the acceptance criteria found in Section 9.4.3.2.2, "Effluent and Environmental Monitoring," of NUREG-1520 (Ex. NRC005) to evaluate the adequacy of GLE's radiological effluent and environmental monitoring program, as discussed in Section 9.3.3 of the SER (Ex. NRC001). However, NUREG-1520 was not used in the NRC staff's environmental review or in preparation of the FEIS (Ex. NRC003).

The following are some additional NRC guidance documents available to applicants that are relevant to radiological effluent monitoring and environmental monitoring:

- Regulatory Guide (RG) 4.15, "Quality Assurance for Radiological Monitoring Programs – Effluent Streams and the Environment" (Ex. NRC077). This document describes an acceptable method for designing a program to ensure the quality of radiological effluent and environmental monitoring results.
- RG 4.16, "Monitoring and Reporting Radioactivity in Releases of Radioactive Materials in Liquid and Gaseous Effluent from Nuclear Fuel Processing and Fabrication Plants and Uranium Hexafluoride Production Plants" (Ex. NRC078). This document describes an acceptable method for the development and implementation of radiological effluent monitoring programs, and for monitoring effluents and reporting data.
- RG 8.37, "ALARA Levels for Effluents from Materials Facilities" (Ex. NRC079). This document describes an acceptable approach for designing a program for establishing and maintaining As Low As Reasonably Achievable (ALARA) levels of gaseous and liquid effluents at material facilities.

- NUREG-1302, "Offsite Dose Calculation Manual Guidance: Standard Radiological Effluent Controls for BWRs" (Ex. NRC080). This document provides guidance for design and implementation of radiological effluent and environmental monitoring programs.

Q5: Please identify the components of the Environmental Monitoring Program for the proposed GLE Facility.

A5: (KF) The Environmental Monitoring Program at the proposed GLE Facility would consist of two components: monitoring of gaseous and liquid effluents at the point of release (effluent monitoring activities), and monitoring of various environmental media in the vicinity of the proposed facility (environmental monitoring activities). Both the effluent and environmental monitoring activities would include radiological and non-radiological analyses. Because General Electric (GE) already conducts effluent and environmental monitoring for existing facilities at the Wilmington Site (and possesses several years of monitoring experience and baseline data), the existing GE monitoring program would be expanded to include the proposed GLE Facility, and would then be known as the Expanded Monitoring Program.

Q6: Please provide an overview of the effluent monitoring (both radiological and non-radiological) planned for the proposed GLE Facility.

A6: (KF) Radiological monitoring of effluent releases would be performed to comply with Federal and State regulations that require monitoring and reporting of radionuclides in gaseous and liquid effluents released to the environment from specific points at the proposed GLE Facility. These requirements are specified in 10 CFR Part 20, Appendix B; 10 CFR 70.59; 40 CFR 70.6(a)(3); 40 CFR 122.48; 40 CFR 123.25; 15A N.C. Admin. Code 02Q.0508; and 15A N.C. Admin. Code 2B.0500. The radiological effluent monitoring program for the proposed GLE Facility is based on these regulatory requirements, the existing monitoring program at the Wilmington Site, and the NRC guidance documents cited in response to the previous question.

Non-radiological monitoring of chemical constituents in effluent releases would be performed to comply with requirements contained in permits issued by other agencies and in

other agencies' regulations. To comply with the conditions of the air permit issued by the North Carolina Department of Environment and Natural Resources (NCDENR), Division of Air Quality, the Expanded Monitoring Program would include weekly analysis of hydrogen fluoride (HF) and uranium released from the facility stack. HF and uranium would also be monitored in liquid effluents. Other chemicals and water quality parameters would also be monitored in liquid effluent as required by the National Pollutant Discharge Elimination System (NPDES) permit for the Wilmington Site (which is administered by the NCDENR, Division of Water Quality) (see Exs. NRC041, NRC042, NRC043).

Effluent monitoring would include radiological and non-radiological analyses, including the following components:

- airborne effluent release monitoring; and
- liquid effluent release monitoring.

Because the Wilmington Site has a permit to reuse treated sanitary wastewater effluent as makeup water in site cooling towers, discharges to Outfall 002 have not occurred since 2008 and no discharge of treated sanitary wastewater effluent from the proposed GLE Facility is anticipated. Should discharge to surface waters become necessary, the existing Wilmington Site NPDES permit would allow the resumption of discharges via Outfall 002, and the outfall would be monitored in accordance with the NPDES permit (see Exs. NRC041, NRC042).

The following table provides a summary of the effluent monitoring activities planned for the proposed GLE Facility:

Effluent/Location	**Monitoring**	**Analysis/Frequency**
Ventilation system exhaust (stack)	Continuous air particulate filter	• Gross alpha – daily (initial) reducing to weekly • Fluoride – weekly
Treated process wastewater (Outfall 001)	Continuous proportional	• Total uranium – daily composite • Gross alpha and beta – weekly composite of daily samples • Technetium-99 – quarterly

		composite of weekly samples • Metals, pH, cyanide, fluoride, nitrogen, suspended solids, oil and grease, toxic organics – weekly, monthly, or quarterly
Treated sanitary wastewater (Outfall 002, if discharges resume)	Continuous proportional	• Biochemical oxygen demand, chlorine, suspended solids, fecal coliform, flow, phosphorous, nitrogen, temperature – weekly, monthly, or quarterly

Q7: Please explain how hazardous and radiological effluent releases will be tracked as part of the effluent monitoring for the proposed GLE Facility.

A7: (TJ) At the proposed GLE Facility, effluents would be released from specified and monitored locations, including the plant stack for airborne effluents and the water outflow locations by way of the onsite lagoons. In each case, the effluents would be filtered, treated, and monitored. GLE would use the sampling data to track the release trends, which would be documented in an annual ALARA report. The projected doses would also be calculated and evaluated as part of the Applicant's dose impact assessments for evaluating ALARA. Corrective actions would be taken if trends indicate that administrative limits on effluent releases may be exceeded. In addition, GLE would submit semiannual effluent release reports in accordance with 10 CFR 70.59. These semiannual release reports are required to specify the quantity of each of the principal radionuclides released to unrestricted areas in liquid and gaseous effluents and to provide information to estimate the maximum potential annual radiation doses to the public resulting from those releases. If quantities of radionuclides released during the reporting periods are significantly higher than GLE's design objectives that were previously reviewed as part of the licensing review, the report must address this issue. Based on this information and tracking trends in effluent release data, the NRC has reasonable assurance that GLE will take appropriate actions to protect public health and safety.

GLE has provided commitments in its license application to minimize effluents consistent with the ALARA principle. To verify that GLE is minimizing effluents consistent with the ALARA principle, it will conduct monitoring and tracking of both airborne and liquid effluents. The commitments include trending of the data and corrective actions when administrative limits have the potential to be exceeded. Therefore, the NRC staff finds that the effluent monitoring and tracking programs provide reasonable assurance of protecting health safety and the environment, and complies with the regulations in 10 CFR 20.1302 and 70.59, and guidance in RG 4.16, "Monitoring and Reporting Radioactivity in Releases of Radioactive Materials in Liquid and Gaseous Effluents from Nuclear Fuel Processing and Fabrication Plants and Uranium Hexafluoride Production Plants" (Ex. NRC078).

Q8: Please provide an overview of the environmental monitoring (both radiological and non-radiological) planned for the proposed GLE Facility.

A8: (KF) Monitoring for contaminants in various environmental media near the proposed GLE Facility would be performed to verify the validity of effluent monitoring results, verify that containment and effluent controls are working properly, and provide a means for evaluating the impacts from GLE operations on the local environment. As noted earlier in this pre-filed testimony, environmental monitoring would include radiological and non-radiological analyses, including the following components:

- Direct radiation monitoring. Thermoluminescent dosimeters would be deployed at strategic locations along the boundaries of the UF_6 cylinder storage pads and along the fenceline of the proposed GLE Facility to monitor direct radiation exposure and to demonstrate compliance with NRC and State radiation protection requirements.
- Ambient air monitoring. Eleven continuous air monitors would be deployed for collection and analysis of a weekly composite for gross alpha activity and concentrations of uranium isotopes. Nine of these air monitors would be deployed in predominant wind directions (three north, three south, one east, and two west), providing coverage of

potential impacts from all wind directions. An additional air monitor would be deployed at the Wilmington Site boundary (approximately 0.3 mile northeast of the facility stack) where the highest potential offsite impact from the proposed GLE Facility is predicted to occur. Finally, an air monitor would be deployed approximately 0.5 mile to the west-northwest of the facility stack in the least-prevailing wind direction to represent onsite background.

- Process wastewater monitoring. After treatment of process wastewater to remove uranium and fluoride (and after further treatment in the Wilmington Site final process lagoon facility), liquid effluent from the proposed GLE Facility would be discharged under the Wilmington Site NPDES permit to the effluent channel via Outfall 001 (see Exs. NRC041, NRC042). Monitoring of the effluent at Outfall 001 would include daily composite samples for uranium, weekly composite analysis of daily samples for gross alpha and beta activities, and quarterly composite analysis of weekly samples for technetium-99. Additional monitoring at Outfall 001 would address NPDES requirements for evaluation of metals, pH, cyanide, fluoride, nitrogen, phosphorous, suspended solids, oil and grease, and toxic organics (see Exs. NRC041, NRC042).
- Stormwater runoff monitoring. Stormwater runoff from the UF_6 cylinder storage pads would be collected in a lined holding pond and monitored for uranium, gross alpha and beta activities, and fluoride prior to release to the GLE stormwater wet detention basin. Stormwater monitoring at the Wilmington Site is conducted semiannually at stormwater outfalls (during storm events) under the Wilmington Site NPDES permit (see Ex. NRC043). Monitoring parameters include lead, oil and grease, pH, and suspended solids.
- Surface water and sediment monitoring. Monthly grab samples of the Wilmington Site effluent channel (at the site dam), the Northeast Cape Fear River 17 miles upstream of the Wilmington Site, and the Northeast Cape Fear River at the Wilmington Site dock

(downstream of the effluent channel discharge point) would continue to be analyzed for gross alpha and beta activities and concentrations of uranium isotopes. Sediment in the effluent channel (downstream of Outfall 001) would continue to be analyzed semiannually for concentrations of uranium isotopes.

- Groundwater monitoring. Thirteen new groundwater monitoring wells would be installed in the vicinity of the proposed GLE Facility to complement the eight existing wells in the north-central sector of the Wilmington Site. These 21 wells would be arranged in seven groups (on the basis of groundwater flow directions at the site), with wells installed at three depths for each group. Sampling for uranium and fluoride concentrations would commence prior to startup, in order to establish baseline data at these new sampling locations. Sampling would be performed quarterly after startup of operations, until sufficient data is collected to justify adjustment of the sampling frequency. Gross alpha and beta analysis would be performed if the uranium concentration in a well exceeds a defined threshold. In addition, groundwater elevation, pH, temperature, and specific conductance would be monitored in each sample.
- Soil monitoring. Four new sampling locations (two to the north and two to the south of the proposed GLE Facility) would be added to supplement the existing soil sampling and analysis program at the Wilmington Site. Sampling would commence prior to startup, in order to establish baseline data at these new sampling locations. Sampling for uranium concentrations would be performed semiannually.

The following table provides a summary of the environmental monitoring activities planned for the proposed GLE Facility:

Type	**Locations**	**Analysis/Frequency**
Direct radiation (TLD)	UF_6 storage pads	• Gamma/neutron – semiannually
Continuous airborne particulate	11 monitors (9 fenceline)	• Gross alpha – weekly • Uranium isotopes – weekly
Surface water	3 locations (grab),	• Gross alpha/beta – monthly

	including site dam, Northeast Cape Fear River 17 miles upstream, and Northeast Cape Fear River at the Wilmington Site dock (downstream of site discharge point)	• Total uranium – monthly
Groundwater	21 wells (grab)	• Total uranium – quarterly • Gross alpha/beta – if total uranium >0.02 mg/L • Fluoride – quarterly • Elevation, pH, temperature, and specific conductance – quarterly
Stormwater	UF_6 cylinder storage pad holding pond (grab)	• Gross alpha/beta – before transfer to wet detention basin • Total uranium – before transfer to wet detention basin • Fluoride – before transfer to wet detention basin
Stormwater	3 stormwater outfalls (grab)	• Lead, oil and grease, pH, and suspended solids – semiannually
Soil	4 locations (shallow grab)	• Total uranium – semiannually
Sediment	Existing locations (grab), including effluent channel downstream of Outfall 001	• Total uranium – semiannually

Q9: Please identify the monitoring locations relative to the proposed GLE Facility.

A9: (KF) The locations of ambient air monitoring, surface water discharge, groundwater monitoring, and soil monitoring for the proposed GLE Facility are shown, respectively, in the following figures from GLE's ER (Ex. GLE006):

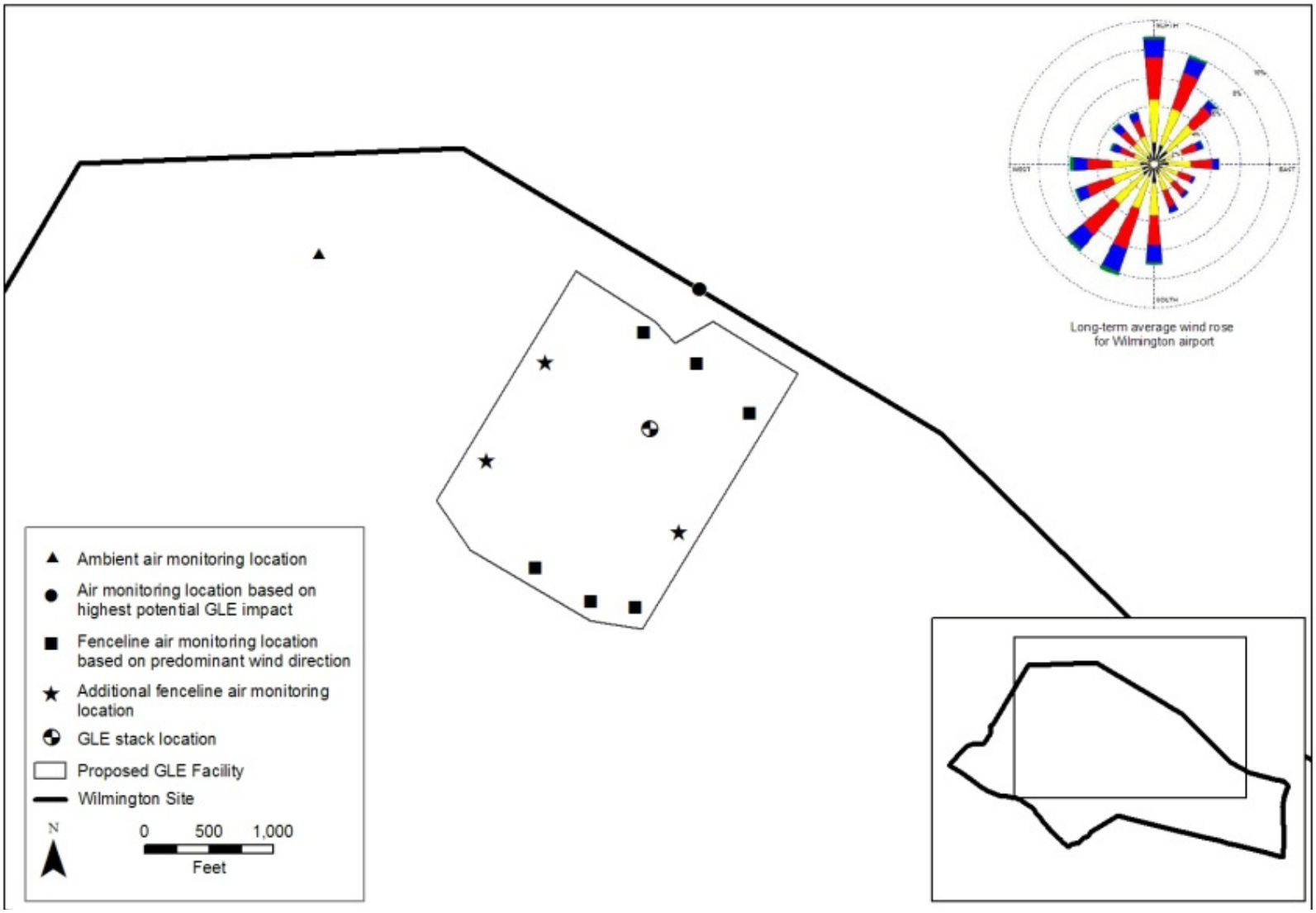


Figure 1. GLE Air Monitoring Locations

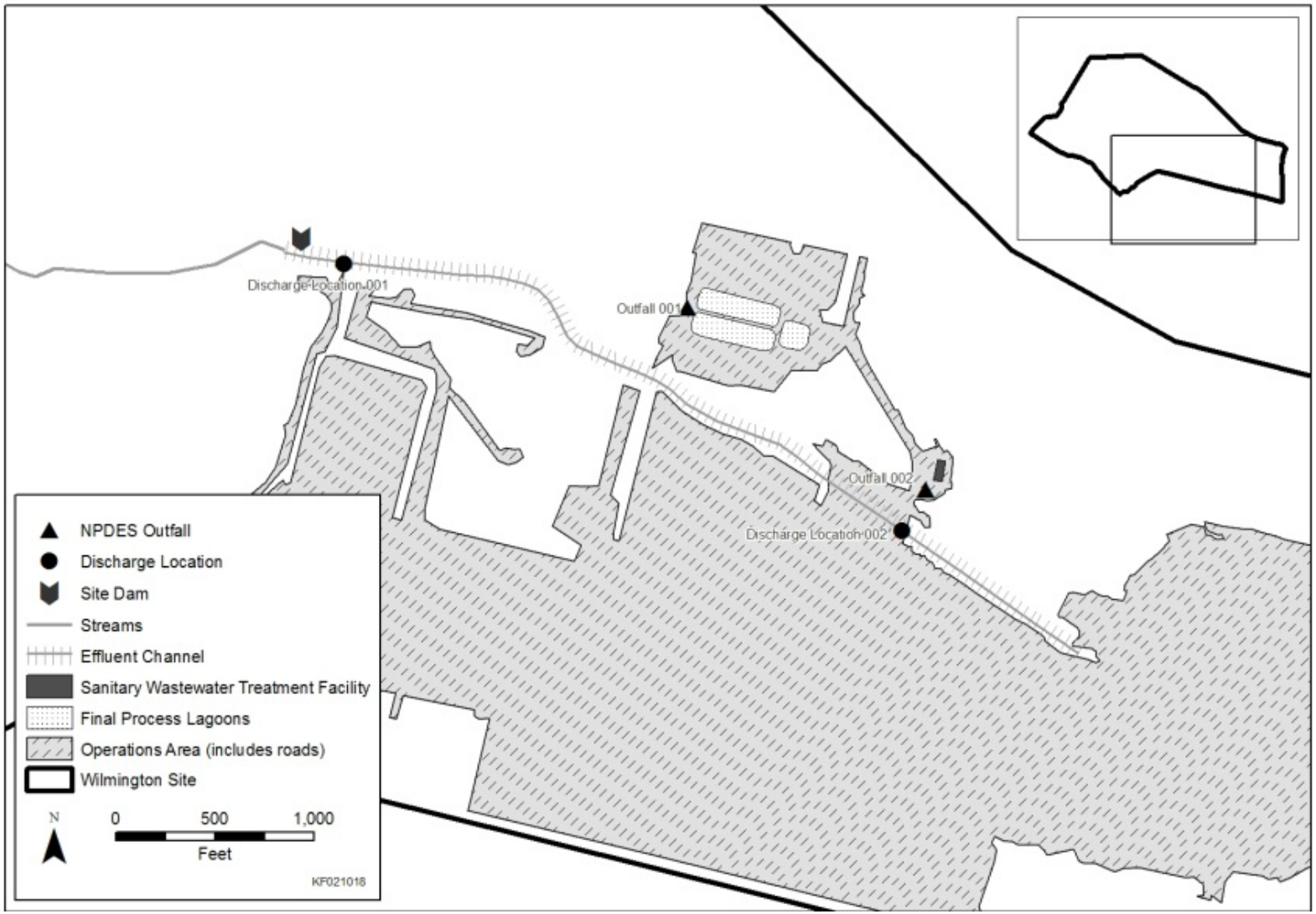


Figure 2. Liquid Effluent Discharge Points at the Wilmington Site

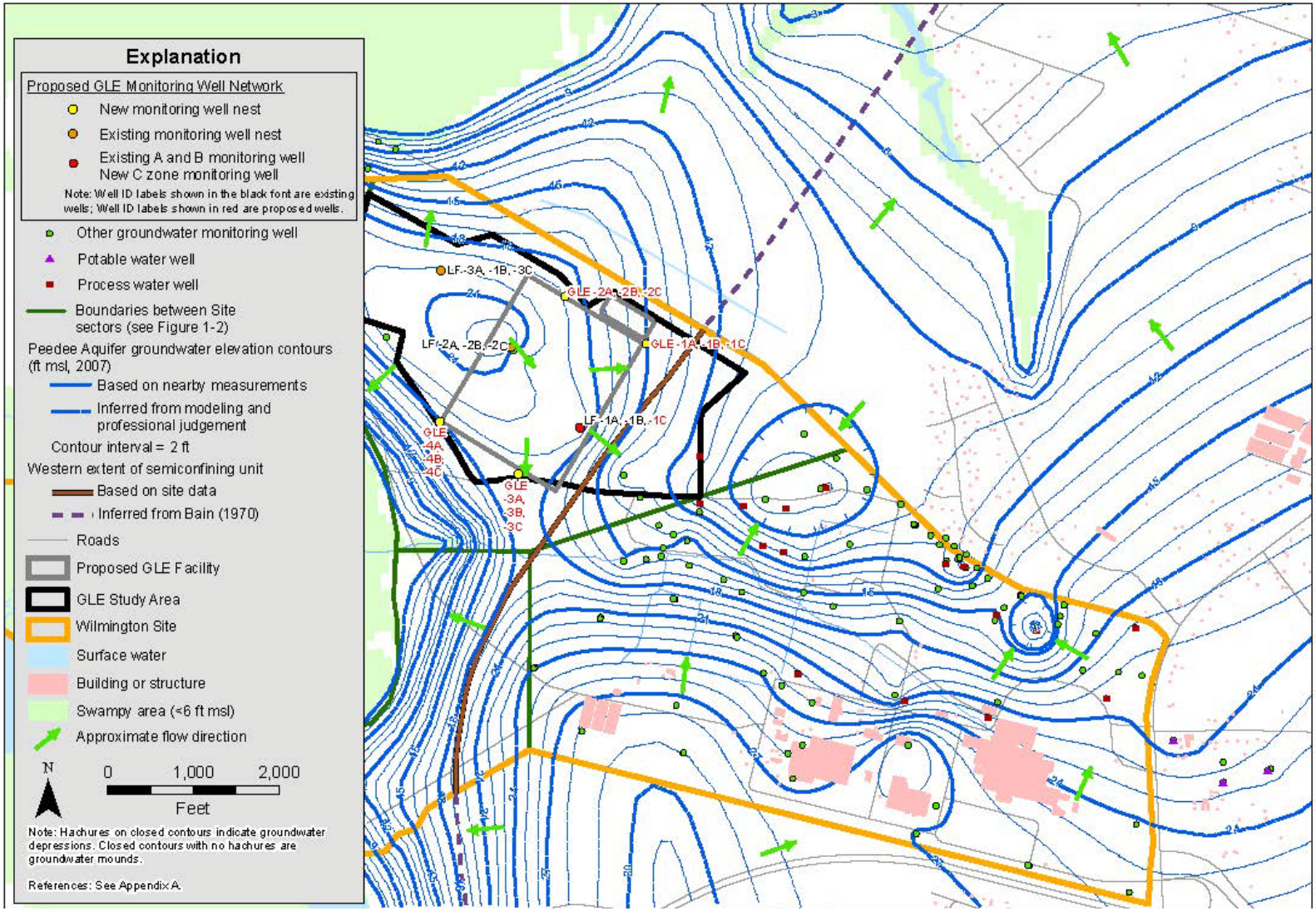


Figure 3. GLE Groundwater Monitoring Locations

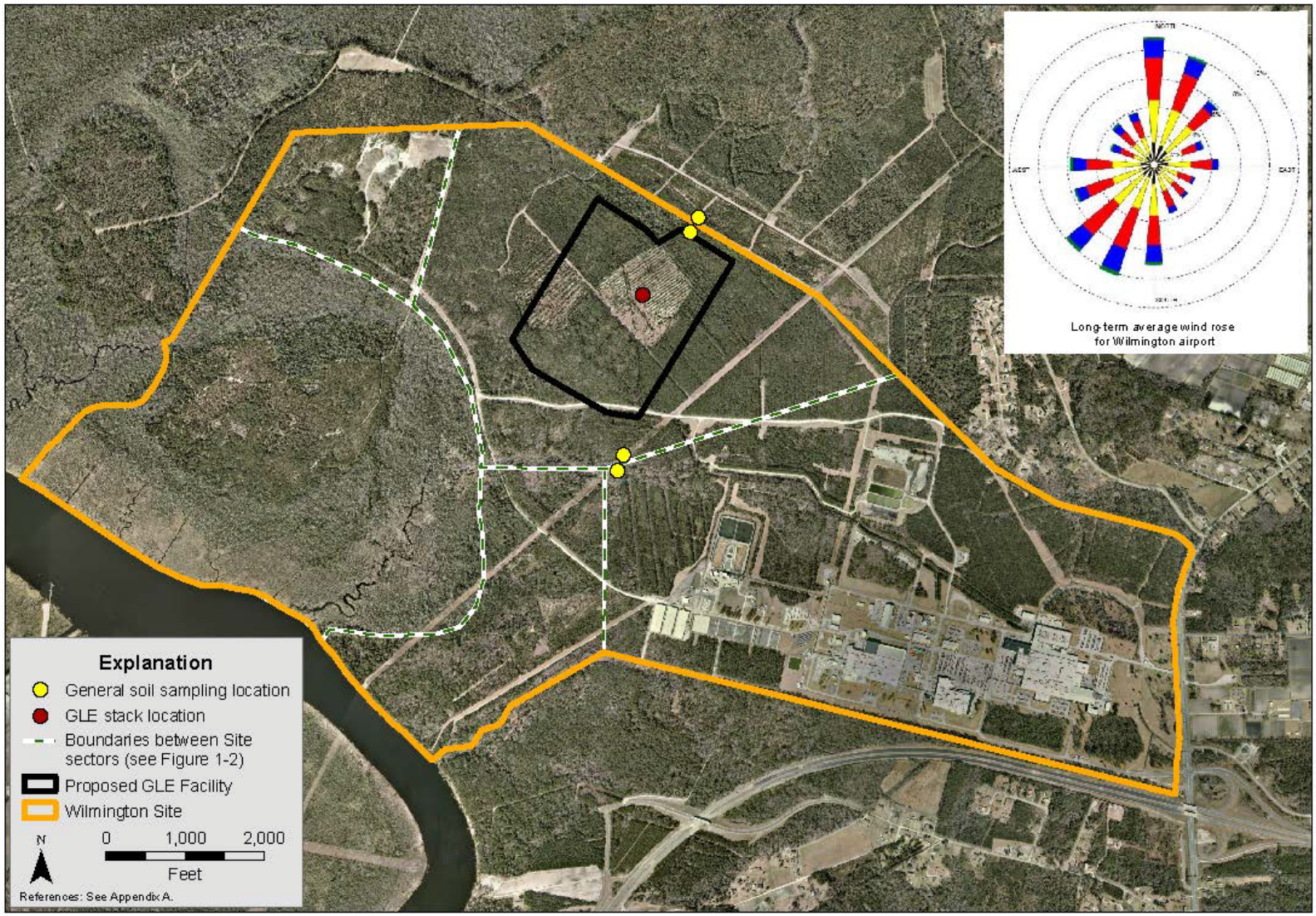


Figure 4. GLE Soil Sampling Locations

Q10: Please describe any other environmental monitoring that would be performed in the vicinity of the proposed GLE Facility.

A10: (KF) The NCDENR Division of Water Quality conducts water quality monitoring in the Lower Cape Fear River watershed, maintaining two monitoring stations along the Northeast Cape Fear River (upstream and downstream of the Wilmington Site). Monitoring parameters include metals, arsenic, biochemical oxygen demand, chloride, dissolved oxygen, fecal coliform, nitrogen, pH, salinity, phosphorous, suspended solids, and temperature. North Carolina's Division of Environmental Health, Radiation Protection Section (RPS) (which was previously part of the NCDENR, but is now part of the Department of Health and Human Services), also conducts routine environmental sampling and analysis within the vicinity of the Wilmington Site, primarily due to the operation of the existing Global Nuclear Fuel-Americas facility on the Wilmington Site. The RPS environmental surveillance program includes low-volume air sampling and sampling of vegetation, sediment, soil, surface water (including the locations monitored by GE and the NC Division of Water Quality), and groundwater.

In addition, water quality monitoring in the Lower Cape Fear River watershed is performed by the Lower Cape Fear River Program, a collaboration of the University of North Carolina at Wilmington, the NCDENR, industry, and the public. Physical, chemical, and biological measurements are routinely collected at 34 sites within the Cape Fear River Estuary and Lower Cape Fear River watershed, including the Lower Cape Fear River at the Wilmington Site dock (downstream of the effluent channel discharge point).

Q11: Identify the NRC regulatory requirements that apply to the Environmental Monitoring Program for the proposed GLE Facility.

A11: (MAB) The proposed GLE Facility's Environmental Monitoring Program must comply with the principles of ALARA as required by 10 CFR 20.1101(b) and with the dose limits for a member of the public as defined in 10 CFR 20.1301 and 20.1302. Specifically, 10 CFR 20.1302(b)(2)(i) requires that the radioactive materials released in effluents do not result in a

dose that exceeds the limits specified in Table 2 of Appendix B to 10 CFR Part 20. The regulations in 10 CFR Part 20 focus on doses to individuals (workers and the public). Effluents must be controlled such that individuals potentially exposed to the effluents do not exceed the dose limits for a member of the public, as defined in 10 CFR 20.1302(b)(2)(ii). Applicants are required by 10 CFR 20.1406(a) to describe in their applications how the facility design and procedures minimize contamination to the environment, among other things. In addition, 10 CFR 20.1501 requires that the licensee have adequate survey and monitoring programs.

Q12: Explain how the NRC staff evaluated the adequacy of the Environmental Monitoring Program (both the effluent and environmental monitoring subcomponents) for the proposed GLE Facility.

A12: (SE, MAB) The NRC staff found the Applicant's effluent and environmental monitoring programs for the proposed facility to be acceptable because those programs met the regulatory requirements found in 10 CFR Part 20, Appendix B, and the acceptance criteria for air and liquid effluent monitoring and environmental monitoring that are identified in Sections 9.4.3.2.2(1) and 9.4.3.2.2(2) of the Standard Review Plan, NUREG-1520 (Ex. NRC005). These acceptance criteria address, among other things, background level baselines for radiological and non-radiological analyses, monitoring sampling locations and methods, trends in monitoring data, radionuclide-specific analyses, quality control, action levels and corrective actions, and accidental releases. The NRC staff also verified that the effluent monitoring program will be conducted consistent with RG 8.37, "ALARA Levels for Effluents from Materials Facilities" (Ex. NRC079).

Q13: Please discuss why the NRC Staff concluded that the Applicant's proposed measures for environmental monitoring are adequate.

A13: (SE, MAB) The NRC staff evaluated the Environmental Monitoring Program against the acceptance criteria in Section 9.4.3.2.2(1) and (2) of NUREG-1520 (Ex. NRC005), and found the program to be acceptable. The Applicant also commits to implement its

Environmental Monitoring Program consistent with ALARA and guidance in Regulatory Guide 8.37 (Ex. NRC079). The proposed GLE Facility controls the air effluents and liquid effluents by minimizing contamination through the radiation protection program described in LA Chapter 4 (Ex. GLE004). The facility uses the two complimentary mechanisms of containment and ventilation to minimize effluents. Containment involves prevention of releases from both the processing equipment and the buildings. Process equipment is designed so that leaks are contained within the process equipment. The process buildings are divided into ventilation zones to further confine airborne releases to localized areas. Confinement assures effluents are routed through ventilation, filtration, and monitoring systems prior to release to the environment.

Potentially contaminated ventilation exhaust is vented to the Operations Building Stack through high-efficiency filter media that are at least 99.97 percent efficient for removal of 0.3 micron particles. In addition to the High-Efficiency Particulate Arresting (HEPA) filters, a system of pre-filters, pressure monitors, and high-efficiency gas absorption filters are used to minimize airborne releases. A number of secondary ventilation systems are incorporated into the facility design, including back-up power to the ventilation systems, secondary filtration, isolation of highly contaminated areas, and shut-down procedures. The combination of confinement and ventilation minimizes effluent releases.

The Applicant committed that all liquid effluents from the proposed GLE Facility would be verified to comply with the limits in Table 2 of 10 CFR Part 20, Appendix B, prior to release to the environment. To ensure that liquid effluents are minimized, the Applicant has committed to implement a monitoring and treatment program. Contaminated liquid effluents are sent to an onsite treatment facility. There, they are treated chemically, and filtered to remove both uranium and fluoride products. Once the concentrations have been verified through continuous sampling to be below the release limits in 10 CFR Part 20, the effluents can be released to the Cape Fear River. Based on the Applicant's commitments described in this response and the NRC staff's

review of the effluent monitoring and treatment program for the proposed GLE Facility, the NRC staff has determined that the program provides reasonable assurance that public health and safety will be protected and complies with the regulations in 10 CFR 20.1301 and 20.1302.

Q14: Please describe how the Applicant will use the results of the monitoring program to correct problems and ensure ongoing compliance with environmental requirements.

A14: (SE, MAB) Section 9.2 of the Applicant's LA (Ex. GLE004) indicates that the purpose of its Environmental Protection Program is to ensure that exposure of the workers, public, and environment to radioactive materials will be kept ALARA, in part, through effluent and environmental monitoring. Airborne or liquid radionuclide analyses will be performed more frequently whenever there is a significant non-routine, unexplained increase in gross radioactivity.

Section 9.3.3.1 of the SER (Ex. NRC001) provides that the action level for environmental measurements is the concentration (or mass) of an analyte that indicates that some action needs to be taken, such as initiating an investigation or, if the level is sufficiently high, shutting down operations. The Applicant's corrective action program would be implemented to ensure that the cause for the action level exceedance of 10 CFR Part 20, Appendix B, limits can be identified and corrected.

As noted in Chapter 6 of the FEIS (Ex. NRC003), in addition to routine sampling under the Expanded Monitoring Program, the Applicant would have provisions in place to respond to emergency situations, accidents, or increased emission levels found in routine sampling. Effluent compliance levels would be set primarily in the respective permits issued and administered by the NCDENR and under NPDES permits. To ensure that the permit requirements are met, administrative action levels would be established at levels below compliance levels for all measured parameters. Response actions for elevated measurements would be set in documented procedures at increasing levels of priority, ranging from increasing

monitoring frequency, to adjusting operations, and performing corrective actions to prevent exceedances of regulatory compliance levels.

As part of its monitoring program, the Applicant has a leak detection system in areas where liquid effluents are processed to prevent unplanned releases to groundwater, surface water, and soil. Section 9.3.2.4 of the SER (Ex. NRC001) provides that ALARA reviews include trends in airborne concentrations of radioactivity, personnel exposures, and environmental monitoring results, as well as programs for improving the effectiveness of equipment and procedures used for effluent and exposure control.

Section 4.7.10 of the LA (Ex. GLE004) describes the establishment of a Corrective Action Program for personnel contamination. If contamination on individuals is identified above background levels, the individuals must undergo decontamination with assistance from the Radiation Protection staff. Protective clothing requirements are identified in the LA (Ex. GLE004), Table 4-2, “Personnel Protective Clothing.”

Section 4.7.11 of the LA (Ex. GLE004) describes corrective actions required in the event of airborne release. Actions include increased air sampling, investigation by the Radiation Protection staff, and implementation of follow-up actions to prevent recurrence. Corrective actions are implemented when monitoring determines administrative limits have been exceeded.

In Section 4.7.13 of the LA (Ex. GLE004), the Applicant states that it will restrict the release of materials, equipment, and other items with removable surface contamination that do not meet the unrestricted release criteria. A radiation survey and monitoring program will include requirements for controlling radiological contamination within the facility and monitoring external and internal radiation exposures.

The Applicant committed in its LA to establish action levels in internal procedures below regulatory limits that will be used for comparison against sampling data for both effluent monitoring and dose impact assessments. If a negative trend is observed or an action level is

exceeded, the Applicant committed in its LA to take action, including source term investigation, filter change out, operational modification, or even operations shutdown. Corrective actions will be implemented and documented by the Applicant based on the severity of the event. Corrective actions include investigation by the radiation protection staff when monitoring programs identify abnormal radiation levels. The Applicant's commitments to monitor airborne and liquid contamination, to compare the measurements to written actions levels, and to take corrective actions provide the NRC staff with reasonable assurance that public health and safety will be protected and demonstrate compliance with the regulations in 10 CFR 20.1101.

Q15: Please identify the types of NRC inspections that involve the Environmental Monitoring Program for the proposed GLE Facility, and briefly describe the inspection procedures applicable to the Environmental Monitoring Program for the proposed GLE Facility.

A15: (JD) If a license is issued for the proposed GLE Facility, prior to the start of operations, the NRC will conduct Operational Readiness Review (ORR) inspections. The ORR inspections will be required by a license condition. The ORR inspections will assess program safety readiness, and will assess the different areas that encompass the Environmental Monitoring Program. These inspections will ensure that the program is adequately implemented. If a license is issued for the proposed GLE Facility, NRC Region II inspectors will inspect the proposed facility's programs prior to the start of operations. If significant issues are identified during the ORR inspections, NRC authorization of operations will be impacted. For instance, the NRC could delay the issuance of authorization of operations until the significant issues identified during the ORR inspections are resolved. The results of these inspections will be documented in inspection reports. Most of these reports (e.g., non-safeguards reports) will be available to the public in the NRC's Agencywide Documents Access and Management System (ADAMS).

If a license is issued for the proposed GLE Facility, after the proposed facility receives authorization from the NRC to operate, the NRC will perform environmental inspections of the

facility using Inspection Manual Chapter 2600, “Fuel Cycle Facility Operational Safety and Safeguards Inspection Program” (Ex. NRC081). This Manual Chapter provides basic guidance, outlines basic responsibilities, and establishes the Inspection Procedures (IPs) to be used by the NRC. The NRC will use the IPs described in this Manual Chapter (Ex. NRC081) and the license (if a license is issued for the proposed GLE Facility), including special license conditions and tie-down conditions in the license, to base the inspections. The NRC’s inspection program includes inspections in the area of Radiation Protection (IP88030, Ex. NRC082), Effluent Control and Environmental Protection (IP88045, Ex. NRC083), and Radioactive Waste Management (IP88035, Ex. NRC084). The results of these inspections will be documented in inspection reports. Most of these reports (e.g., non-safeguards reports) will be available to the public in ADAMS.

Q16: Please discuss the objectives of each type of NRC inspection that involves the Environmental Monitoring Program.

A16: (JD) The NRC’s inspection program incorporates a core set of inspections that encompass multiple areas. These inspections are performed with a particular periodicity depending on the area to be inspected.

For the area of Radiation Protection, IP88030 (Ex. NRC082) will be used. The objective of this type of inspection is to determine whether the licensee’s performance is in accordance with regulatory requirements related to radiation protection, and to evaluate the adequacy of certain aspects of the licensee's radiation protection program. This inspection takes into consideration the license application, tie-down conditions in the license, and any commitments incorporated into the license.

For the area of Effluent Control and Environmental Protection, IP88045 (Ex. NRC083) will be used. The objectives of this type of inspection are to determine (1) whether the licensee is complying with NRC regulations and license requirements related to the processing, control, release, and reporting of information to the NRC of radioactive liquid and airborne effluents;

(2) whether the licensee is implementing a program to ensure that releases of radioactivity to the environment provide minimal impact on the environment and the public; and (3) whether the licensee maintains adequate management controls for the radiological effluent control and environmental program.

For the area of Radioactive Waste Management, IP88035 (Ex. NRC084) will be used. The objectives of this type of inspection are to determine (1) whether the licensee has established and is maintaining adequate and controlled procedures and quality assurance (QA) programs to ensure compliance with the requirements of 10 CFR Part 20 and 10 CFR Part 61 applicable to low-level radioactive waste form, classification, stabilization, shipment manifests, and shipment tracking; and (2) if the licensee stores low-level radioactive waste, whether the licensee stores and/or disposes of low-level radioactive waste safely and in accordance with license conditions.

Q17: Please discuss the process and consequences that will occur if significant findings are identified during these inspections (discussed in response to the last two questions) with regard to the Environmental Monitoring Program.

A17: (JD) The results of a licensee's environmental monitoring program can indicate if the licensee's environmental protection program is being effective in protecting the environment, and the health and safety of the public, as required by NRC regulations. If an environmental monitoring program is not implemented properly or if effluent limits are exceeded, the inspection program will identify and document such occurrences. The safety significance of such occurrences is assessed in accordance with the NRC Enforcement Policy and the NRC Enforcement Manual. Licensees are required to take effective immediate and long-term corrective actions for issues identified, and should ensure that problems do not reoccur. The NRC inspection program will track inspection findings and will also perform follow-up inspections until the identified issues are closed.

Q18: Please explain how the NRC will use the results of the proposed GLE Facility's Environmental Monitoring Program to correct problems and ensure ongoing compliance with environmental requirements.

A18: (JD) If a license is issued for the proposed GLE Facility, after operations are initiated, the NRC will follow-up on issues identified by GLE's Environmental Monitoring Program. Issues can also be identified as a result of the NRC's core inspections and reactive inspections; the NRC's routine inspections are known as core inspections, while reactive inspections are inspections initiated as a result of an upset condition or plant event that requires an additional inspection. The NRC performs reactive inspections when NRC-licensed facilities notify the NRC of events or problems that are required to be reported under NRC regulations or by license condition requirements.

The NRC will use the results of the applicable inspection procedures to identify issues (e.g., problems or violations of regulatory requirements), and will then request that licensees, including GLE if GLE receives an NRC license, take proper actions. The NRC uses the NRC Enforcement Policy to ensure licensees return to compliance with any identified environmental requirements.

Q19: Does this conclude your testimony?

A19: (KF, TJ, MAB, SE, JD) Yes.

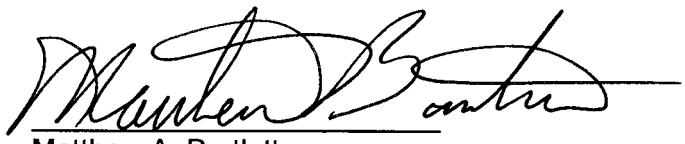
UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket No. 70-7016-ML
	)	
GE-HITACHI GLOBAL LASER ENRICHMENT LLC	)	ASLBP No. 10-901-03-ML-BD01
	)	
	)	June 18, 2012
(GLE Commercial Facility)	)	

AFFIDAVIT OF MATTHEW A. BARTLETT

I, Matthew A. Bartlett, do hereby declare under penalty of perjury that my statements in the foregoing testimony and my statement of professional qualifications are true and correct to the best of my knowledge and belief.



Matthew A. Bartlett

Executed at Rockville, Maryland
this 18th day of June, 2012

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket No. 70-7016-ML
	)	
GE-HITACHI GLOBAL LASER ENRICHMENT LLC	)	ASLBP No. 10-901-03-ML-BD01
	)	
	)	June 18, 2012
(GLE Commercial Facility)	)	

AFFIDAVIT OF JOSÉ DÍAZ

I, José Díaz, do hereby declare under penalty of perjury that my statements in the foregoing testimony and my statement of professional qualifications are true and correct to the best of my knowledge and belief.

José Díaz

Executed at Atlanta, Georgia
this 18th day of June, 2012

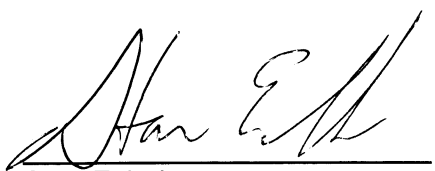
UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket No. 70-7016-ML
	)	
GE-HITACHI GLOBAL LASER ENRICHMENT LLC	)	ASLBP No. 10-901-03-ML-BD01
	)	
	)	June 18, 2012
(GLE Commercial Facility)	)	

AFFIDAVIT OF STAN ECHOLS

I, Stan Echols, do hereby declare under penalty of perjury that my statements in the foregoing testimony and my statement of professional qualifications are true and correct to the best of my knowledge and belief.



Stan Echols

Executed at Rockville, Maryland
this 18th day of June, 2012

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket No. 70-7016-ML
	)	
GE-HITACHI GLOBAL LASER ENRICHMENT LLC	)	ASLBP No. 10-901-03-ML-BD01
	)	
	)	June 18, 2012
(GLE Commercial Facility)	)	

AFFIDAVIT OF KARL FISCHER

I, Karl Fischer, do hereby declare under penalty of perjury that my statements in the foregoing testimony and my statement of professional qualifications are true and correct to the best of my knowledge and belief.

Karl Fischer

Executed at Ann Arbor, Michigan
this 18th day of June, 2012

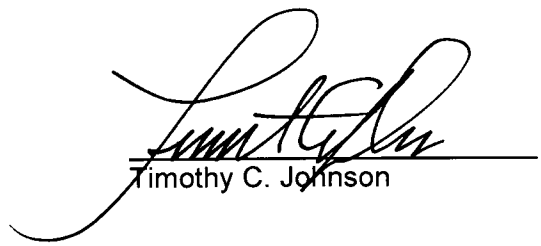
UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	Docket No. 70-7016-ML
	)	
GE-HITACHI GLOBAL LASER ENRICHMENT LLC	)	ASLBP No. 10-901-03-ML-BD01
	)	
	)	June 18, 2012
(GLE Commercial Facility)	)	

AFFIDAVIT OF TIMOTHY C. JOHNSON

I, Timothy C. Johnson, do hereby declare under penalty of perjury that my statements in the foregoing testimony and my statement of professional qualifications are true and correct to the best of my knowledge and belief.



Timothy C. Johnson

Executed at Rockville, Maryland
this 18th day of June, 2012

Matthew Bartlett
Statement of Professional Qualifications

CURRENT POSITION

Project Manager and Health Physics Reviewer
Conversion, Deconversion, and Enrichment Branch
Division of Fuel Cycle Safety and Safeguards
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C.

EDUCATION

Ph.D., Physics, Clemson University, South Carolina, 2004
M.S., Physics, Clemson University, South Carolina, 2000
B.S., Physics, Bob Jones University, 1997

PROFESSIONAL

Project Management Qualification, NRC, 2007
Health Physics Reviewer Qualification, NRC, 2007

QUALIFICATIONS

Dr. Bartlett is a project manager and health physics (HP) reviewer with more than 7 years of work experience as a license reviewer at the NRC. His experience includes the HP review of the license renewal for the Westinghouse Electric Company Nuclear Fuels, Columbia, SC.; the HP review of renewal for Babcock & Wilcox Nuclear Operations Group, Inc., Lynchburg, VA.; and the HP review of the license application for the Mixed Oxide Fuel Fabrication Facility, Aiken SC. He serves as the technical contact on the working group to incorporate Integrated Safety Analysis requirements into 10 Code of Federal Regulations (CFR) 40, similar to 10 CFR Part 70. He also serves as the Nuclear Material Safety and Safeguard Offices Radiation Safety Officer. As a project manager he has overseen the licensing review of the proposed International Isotopes Fluorine Project, Inc. facility in Hobbs, NM. He has also overseen numerous licensing actions for fuel facilities including: physical protection plan, amendments, and decommissioning requests.

Prior to working for the NRC, he was a teaching and research assistant in graduate school at Clemson University, Clemson, South Carolina, where his responsibilities included teaching undergraduate physics courses, research in biomedical optics, and development of his own thesis.

José M. Díaz Vélez
Statement of Professional Qualifications

CURRENT POSITION

Sr. Fuel Facility Project Inspector
Fuel Facility Inspection Branch 2
Division of Fuel Facility
Region II Office
U.S. Nuclear Regulatory Commission
Atlanta, Ga 30303

EDUCATION

M.Div., Biblical Languages, New Orleans Baptist Theological Seminary, New Orleans, LA
B.S., Physics, University of Puerto Rico, Mayaguez, PR

PROFESSIONAL

Fuel Facility Material Control and Accounting Inspector (July 2011)
Reactor Health Physics Inspector (July 2006)
Materials License Reviewer (August 2003)
Materials Radiation Specialist Inspector (August 1994)

QUALIFICATIONS

Mr. Díaz is an NRC Region II inspector with over 19 years of experience implementing the NRC Inspection Program. As a Sr. Fuel Facility Project Inspector for the Nuclear Regulatory Commission, Mr. Díaz is responsible for inspection project oversight over the USEC-Paducah Gaseous Diffusion Plant project. He is responsible for the planning, coordination, and implementation of projects assigned in support of the inspection program. This includes items such as allegations, Commissioner/VIP visits, the inspection planning process, open item tracking and enforcement actions. He also coordinates other activities with NRC offices, government agencies, and the public. Mr. Díaz performs assessment and analysis of complex issues and recommends appropriate NRC Response.

Reviews allegations; plant activities and issues; inspection findings and proposed enforcement actions; licensee reports; and notices of enforcement discretion. He ensures technical adequacy, accuracy, and proper content of reviewed materials, including any corresponding NRC response as appropriate. Mr. Díaz performs evaluations for potential generic issues, and integrates inspection findings into the overall assessment of safety performance at his assigned facility. He makes recommendations for Agency response and actions involving inspection and/or enforcement action.

Responsible for planning and conducting assigned inspections. In addition to support the Regional-based inspection program, Mr. Díaz supports the fuel facility safeguards inspection program in the area of Material Control and Accounting, which is HQ-based. Performs observations and evaluate licensee's compliance with NRC regulatory requirements, license requirements, technical specifications, safety analyses, orders, and industry codes and standards. When requested, he serves as inspection team leader, conducts inspections of

allegations, and participates in emergency preparedness exercises. He voluntarily supports the Regional Incident Response Center when activated.

Mr. Díaz is responsible for preparing written materials associated with allegations, inspections, and responses to outside inquiries. He integrates inspection inputs from other inspectors into team inspection reports. He serves as a mentor and coach of new inspectors. Mr. Díaz performs other duties as assigned, including acting as branch chief in his Division when assigned.

As an NRC Materials Radiation Specialist Inspector, Mr. Díaz was responsible for safety inspections at medical, academic, and industrial facilities that used Byproduct Materials under Title 10 CFR Parts 30-39. Mr. Díaz was also responsible for project inspection oversight of the US Navy Master Materials License and the Centers for Disease Control and Prevention licenses.

As an NRC Materials License Reviewer, Mr. Díaz was responsible for the review of license applications pursuant to medical, academic, and industrial uses of Byproduct Materials. He was responsible for ensuring that applicants meet the minimum licensing requirements for such facilities.

As an NRC Reactor Health Physics Inspector, Mr. Díaz was responsible for performing radiation safety inspections at Nuclear Power Reactors. These inspections included Radiological Environmental Monitoring Program inspections, Radioactive Gaseous and Liquid Effluent Treatment inspections, Radioactive Solid Waste Processing and Radioactive Material Handling, Storage, and Transportation inspections at Nuclear Power Reactors.

As an NRC Material Control and Accounting (MC&A) Inspector, Mr. is responsible for implementing the NRC Inspection Program to ensure that the licensee's MC&A system adequately detects and protects against the loss, theft, or diversion of special nuclear material (SNM) that the licensee is authorized to possess, store, and use.

Stan Echols
Statement of Professional Qualifications

CURRENT POSITION

Senior Project Manager
Senior Environmental Engineer
Fuel Manufacturing Branch
Division of Fuel Cycle Safety and Safeguards
Office of Nuclear Material and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C.

EDUCATION

Ph.D. Environmental Engineering, University of Florida
B.S. Nuclear Engineering Sciences, University of Florida
J.D., Georgetown University Law Center

PROFESSIONAL

District of Columbia Bar, Member
American Nuclear Society, Member
Certificate of Project Management, NRC, 2007
Certificate of Fuel Cycle Safety Environmental License Reviewer, NRC, 2007

QUALIFICATIONS

Stan Echols has over thirty years experience in both the public and private sectors providing regulatory, environmental, technical, legal, and project management support to the nuclear industry and the federal government. He has addressed a broad range of environmental and safety issues affecting nuclear reactors, a fuel manufacturing facility, uranium enrichment facilities, a weapons production facility, and a proposed high-level radioactive waste disposal facility. Dr. Echols has served as a committee member of the National Academy of Sciences Board on Radioactive Waste Management. The committee's mandate was to assess options for improving the regulation and management of low-activity nuclear waste and then to report its recommendations to Congress.

<u>Representative Public and Private Sector Experience</u>

For the past five years, Dr. Echols has been an environmental expert and senior project manager at the NRC. He is the Senior Project Manager for the AREVA NP, Inc. fuel fabrication facility located in Richland, Washington, and is responsible for regulatory reviews associated with license amendments, decommissioning plan and other issues that arise periodically during the course of facility operation. He was also the Senior Project Manager responsible for the license review and preparation of the NRC staff's Safety Evaluation Report (SER) and Environmental Impact Statement (EIS) for a gas centrifuge enrichment plant license application.

He also serves as an expert for various projects in the area of compliance with the environmental requirements under the National Environmental Policy Act (NEPA).

Prior to joining the NRC, Dr. Echols was an associate and partner in the energy group of a national law firm for a period of ten years, where he directed a team of attorneys and support staff in providing counsel to clients regarding federal statutory and regulatory compliance with Environmental Protection Agency, NRC, and Department of Energy (DOE) requirements for nuclear facility licensing.

Before joining the law firm, Dr. Echols was an attorney at DOE where he addressed a broad range of nuclear and environmental issues. He represented the DOE Office of International Affairs in working with other federal agencies to develop marketing strategies regarding regulatory, export credit and related issues for the transfer of nuclear technology. Dr. Echols successfully argued that Agency for International Development (AID) funds lawfully could be used to assess whether nuclear power was a reasonable alternative to conventional base-load power sources. This was the only time that AID funds, under the Foreign Assistance Act, were used to evaluate the feasibility of a nuclear power option. Dr. Echols also served on DOE's Task Force on Nuclear Licensing and Regulatory Reform to draft legislation to streamline NRC commercial nuclear power plant licensing procedures. In addition, he was counsel to a DOE Tiger Team, whose mission was to conduct an overall environmental, safety, and health compliance and management assessment of the Pantex Plant, a DOE nuclear weapons facility.

During this time at DOE, he also served a short tour of duty as a Special Assistant U.S. Attorney, Civil Division, U.S. Attorney's Office for the District of Columbia, where he was responsible for litigation at the district court level and for appellate cases before the U.S. Court of Appeals for the District of Columbia Circuit.

Earlier in his career, Dr. Echols held positions in both the public and private sectors as an environmental engineer and environmental project manager.

Karl Fischer, CHP*
Statement of Professional Qualifications

CURRENT POSITIONS

Senior Health Physicist
Occupational Safety and Environmental Health
University of Michigan
Ann Arbor, Michigan

Environmental Systems Engineer (Pending Special Term Appointment)
Environmental Science Division
Argonne National Laboratory
Argonne, Illinois

EDUCATION

M.Eng., Radiological Health Engineering, University of Michigan
B.S.E., Nuclear Engineering, University of Michigan

PROFESSIONAL

*Certified Health Physicist, 2004 (recertified 2008 and 2012)
Health Physics Society, Member

QUALIFICATIONS

Mr. Fischer is a health physicist with over 15 years of work experience in environmental, defense, and biomedical research applications. At Argonne (2008-2012), he provided health physics and programmatic support for various Federal sponsors, including technical analysis (in resource areas including radiological health, transportation, and waste management), cumulative impacts analysis, program management, and document management for NEPA-based environmental impact assessments; MARSSIM-based closure survey design; and inventory of radiological sources and facilities for use in vulnerability assessment and threat reduction. His areas of expertise are health physics and radiological health risk.

Prior to joining Argonne in 2008, Mr. Fischer worked for three years at Northrop Grumman Information Technology, serving as Deputy Program Manager for the Nuclear Test Personnel Review Program, Defense Threat Reduction Agency (U.S. Department of Defense). He provided comprehensive support of day-to-day program activities, including program administration and management, radiation dose reconstruction policy analysis and development, case management, and interagency relations.

From 1997 to 2005, Mr. Fischer worked as a health physicist and senior health physicist for the National Institutes of Health (NIH), Division of Radiation Safety (U.S. Department of Health and Human Services), ensuring radiological protection of personnel and compliance with regulations governing the use of ionizing radiation at the federal government's premier biomedical research

institution. He provided independent health physics oversight of laboratory operations and new/developing research protocols, including the NIH Cyclotron Facility and associated radiochemical synthesis and research laboratories. His responsibilities included radiation safety surveillance, consultation, and policy enforcement; personnel and environmental effluent monitoring; intake/exposure and security investigations; waste stream analysis, minimization, and incident investigation; emergency and spill response; and decontamination/clearance of rooms and equipment. He periodically functioned as Acting Branch Chief, providing day-to-day oversight of branch operations, coordinating incident response, and participating in policy development.

Prior to earning his graduate degree, Mr. Fischer worked as a health physics intern for the University of Michigan Radiation Safety Service, and as an environmental intern for Westinghouse Hanford Company at the U.S. Department of Energy's Hanford Site.

Timothy C. Johnson
Statement of Professional Qualifications

CURRENT POSITION

Senior Project Manager
Uranium Enrichment Branch
Division of Fuel Cycle Safety and Safeguards
Office of Nuclear Material Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, D.C.

EDUCATION

M.S., Nuclear Engineering, Ohio State University
B.S., Mechanical Engineering, Worcester Polytechnic Institute

PROFESSIONAL

American Nuclear Society, Member
American Society of Mechanical Engineers, Member
American Society for Testing and Materials, Member

QUALIFICATIONS

Mr. Johnson is a nuclear engineer with over 39 years of work experience in industry and in the Federal government. He has been working in the areas of radioactive waste processing, low-level radioactive waste management, high-level radioactive waste management, decommissioning, and uranium enrichment facility licensing.
Mr. Johnson is currently the Licensing Project Manager of the General Electric-Hitachi Global Laser Enrichment (GE) uranium enrichment plant project in the Uranium Enrichment Branch, Division of Fuel Cycle Safety and Safeguards, Office of Nuclear Material Safety and Safeguards, U.S. Nuclear Regulatory Commission. Mr. Johnson received a Bachelor of Science degree in Mechanical Engineering from Worcester Polytechnic Institute in Worcester, Massachusetts, in 1971 and a Master of Science degree in Nuclear Engineering from Ohio State University, in Columbus, Ohio, in 1973. Courses he has taken that are pertinent to his present discipline are in the areas of advanced mathematics, engineering design, mass and heat transport, thermodynamics, reactor theory, nuclear physics, nuclear power plant engineering, and health physics. He was elected to membership in Pi Mu Epsilon, the mathematics honorary society.

From January 1973 to August 1977, Mr. Johnson was employed by Stone & Webster Engineering Corporation in Boston, Massachusetts. As the offgas and ventilation filter system specialist, he was responsible for the technical adequacy of offgas and ventilation filter systems for pressurized water reactor, boiling water reactor, high temperature gas cooled reactor, and liquid metal fast breeder reactor projects. His responsibilities included ensuring that equipment met both applicable regulatory and equipment code requirements. He prepared master specifications for offgas and ventilation filter systems for use by project staff. He reviewed project specifications and performed technical reviews of vendor proposals. He also reviewed vendor procedures for qualification and testing of offgas and ventilation system components.

Since September 1977, Mr. Johnson has been employed by the U.S. Nuclear Regulatory Commission in the areas of radioactive waste management, decommissioning, and fuel cycle facility licensing.

From September 1977 to April 1984, Mr. Johnson had lead responsibility for the waste form performance aspects of low-level radioactive wastes to include radwaste processing, solidification, high integrity containers, and volume reduction systems. In this capacity, he developed programs for analyzing, evaluating, coordinating, and recommending licensing actions related to the waste form and waste classification areas of 10 CFR Part 61. These responsibilities have specifically included coordinating the development of the waste form and waste classification requirements and preparing the appropriate sections for: (1) the low-level waste management regulation, 10 CFR Part 61; (2) the draft and final environmental impact statements that support 10 CFR Part 61; and (3) the technical positions on waste form and waste classification that provide guidance to waste generators for complying with the 10 CFR Part 61 requirements. He also acted as lead for an intra-agency task group for implementation for the 10 CFR Part 61 requirements at nuclear power plants.

During this time, Mr. Johnson also participated on a Task Force responsible for Three Mile Island Unit 2 (TMI-2) waste disposal issue resolution to include the evaluation of EPICOR-II, Submerged Demineralizer System, and decontamination solution wastes. He also prepared and coordinated the waste disposal section for the TMI-2 Programmatic Environmental Impact Statement.

From April 1984 to April 1987, Mr. Johnson was Section Leader of the Materials Engineering Section in the Division of Waste Management. In this capacity, he supervised a section that performed technical and engineering evaluations of low-level and high-level radioactive waste packages. This included planning and executing section programs, providing technical direction and integration of materials concerns into NRC low-level and high-level waste licensing activities, and supervising the management of technical assistance programs.

From April 1987 to May 1992, Mr. Johnson was Section Leader of the Special Projects Section in the Division of Waste Management. In this capacity, he supervised a section responsible for mixed wastes, decommissioning of materials licensee facilities and power reactors, financial assurance for decommissioning materials licensees and low-level waste disposal facilities, greater than Class C wastes, low-level waste disposal site quality assurance, and the low-level waste data base.

From May 1992 to November 1999, Mr. Johnson was Section Chief of decommissioning sections in the Division of Waste Management responsible for developing and executing the Site Decommissioning Management Plan (SDMP), an agency effort to ensure that 17 decommissioning policy issues were resolved and over 40 non-routine decommissioning sites would be properly decommissioned. During this time, he acted as Project Manager for the decommissioning of the Chemetron site in Cleveland, Ohio, a controversial contaminated site located in a residential neighborhood. The site was remediated and the license terminated in 1998.

From November 1999 to the present, Mr. Johnson was a Senior Project Manager in the Division of Fuel Cycle Safety and Safeguards. In this position, he acted as deputy project manager for the Mixed Oxide Fuel Fabrication Facility licensing and project manager for the licensing of gas centrifuge uranium enrichment facilities. He also was the Project Manager of the Louisiana

Energy Services uranium enrichment plant from the project's inception in 2000, through licensing, and into initial plant construction until 2009. As Project Manager, he coordinated the licensing review of the licensing application. He also provided testimony in contested and mandatory hearings for this facility in the areas of uranium enrichment facility licensing, the disposition of depleted uranium, and decommissioning financial assurance. He is currently the Project Manager for the General Electric-Hitachi Global Laser Enrichment uranium enrichment plant responsible for coordinating the licensing review of the facility.

Mr. Johnson has prepared over 25 presentations and papers given at conferences and has been an instructor at American Society of Mechanical Engineering, Harvard School of Public Health, and NRC training courses in the areas of low-level waste management, decommissioning, and uranium enrichment facility licensing.